



Constructivism and Mathematics Instruction: challenges, misconceptions, and myths

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Purpose of the Study

**To examine whether a
constructivist-based
approach to math word
problems will result in
improved performance
among Grade 5 Students
in Belize, Central America**



Design

- Sample 242 Grade 5 Students from Two urban and two rural school
- Switching Replication Design
- Stanley and Campbell (1966)
Pre- test, Posttest Design

Pre-test + Post test 1 + Post test 2



Design Continues

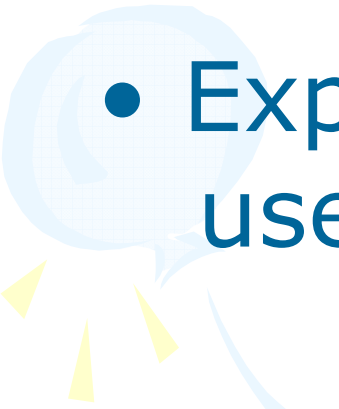
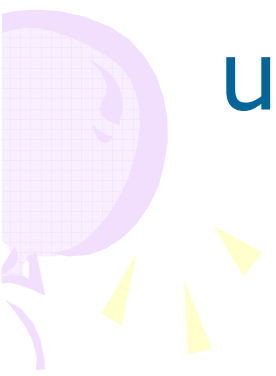
Weeks 1- 6

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- Experimental Groups were taught using a Constructivist Approach
 - Control Groups were taught using a Procedural Approach
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Design Continues

Weeks 7 to 12

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- Experimental Groups continue to use a constructivist approach
 - Control groups are now taught using a constructivist approach



Qualitative Data Collection

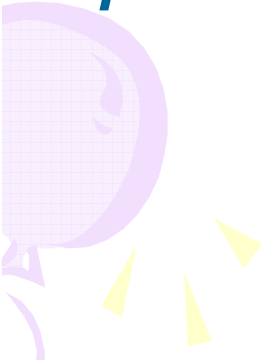
- Semi-structured interviews with teachers and students
 - Video recordings of group interactions to identify examples of knowledge construction
 - Revision of scripts from pre-test, post test 1 and 2
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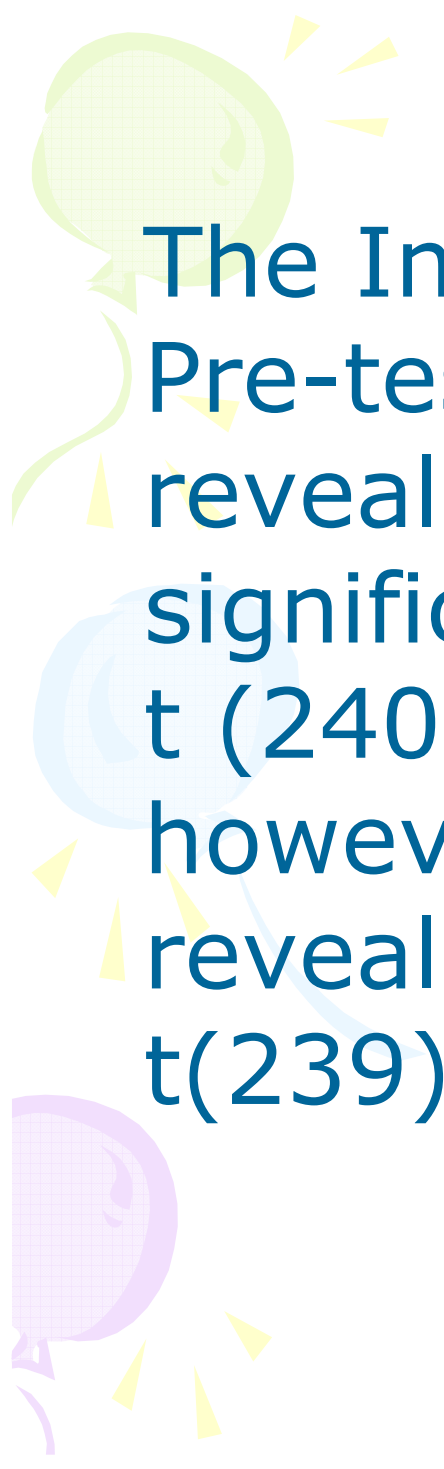


Quantitative Findings

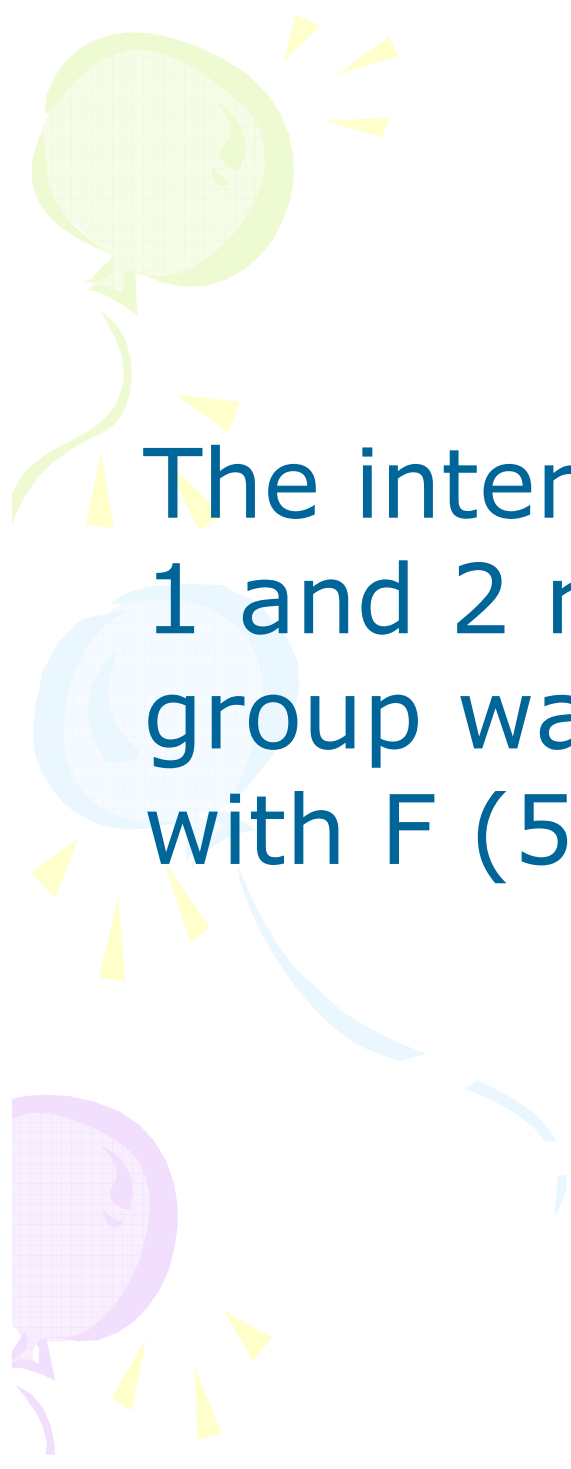
Repeated Measures ANOVA

The interaction between the pre-test and post test 1 results (factor 1) and the group, was found to be significant with $F(59, 00) = 47.08$
 $p < .001$.





The Independent Samples t-test
Pre-test and Post test 1 results
revealed that there was no
significant difference in pre-test,
 $t(240) = 5.692, p < .05$;
however, the post test 1 results
revealed significant difference
 $t(239) = -1.583, p < .05$

Three balloons are positioned on the left side of the slide. The top balloon is green, the middle one is light blue, and the bottom one is purple. Each balloon has a small yellow starburst above it. The text is centered on the slide, overlapping the middle blue balloon.

The interaction between post test 1 and 2 results (factor 1) and the group was found to be significant with $F(54,27) = 97.17$ $p < .001$.



Summary of Findings

- Control Groups performed at higher rates than experimental groups from weeks 1 to 6
- After receiving Constructivist instruction, performance improved further



Conclusion

A combination of the constructivist approach and procedures resulted in higher gains than use of a constructivist approach alone



Challenges

- Traditional teaching habits are difficult to change
- Unless students receive “proper guidelines” to discuss in social learning group, this may never occur



Challenges Continued

- Some students have limited background knowledge or are unable to draw on prior knowledge
- Often students focus on one aspect of the problem and ignore other portions



Misconceptions: The Constructivist Approach

1. Prior knowledge is often limited, or not easily retrieved

Prior experiences do not always advance students' thinking about the problem.



Misconceptions: The Constructivist Approach

2. Constructing Understanding does not occur automatically. Students must be scaffolded over time to discuss and negotiate

There are instances when students seem unable to adequately use prior experiences to interpret a problem due to limited background knowledge and analytical skills



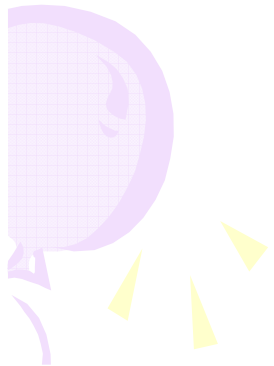
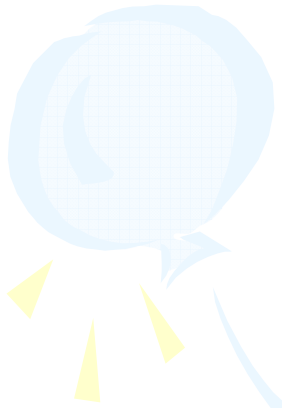
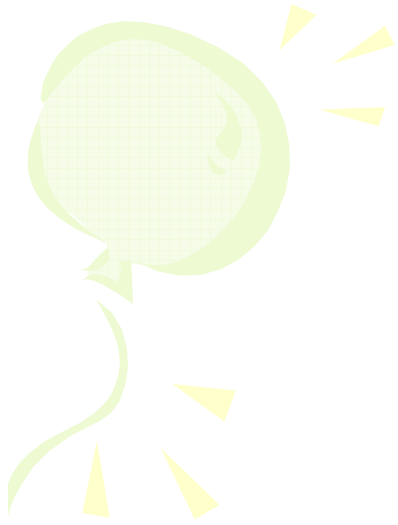
Misconceptions Continued

- Teachers often lack the skills to adequately scaffold learners to critically analyze the problem
- Most students are taught to solve problems mechanically; hence they experience difficulty analyzing novel problems



Myths: The Constructivist Approach

- Use of constructivist math activities is **not** suited for students regardless of background
- Based on cultural background and global motivation, some students do not respond to peers in social learning groups



Questions??